

Contract No: EP-W-09-002
WA #: 075-RDRD-02YP

Region 2 RAC2 Remedial Action Contract

Final Work Plan, Volume 1

San German Groundwater
Contamination Site

Remedial Design

San German, Puerto Rico

July 25, 2018

**CDM
Smith**

**REMEDIAL ACTION CONTRACT 2
FOR REMEDIAL RESPONSE, ENFORCEMENT OVERSIGHT,
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR
THREATENED RELEASE OF HAZARDOUS SUBSTANCES
IN EPA REGION 2**

**FINAL WORK PLAN
VOLUME 1**

**SAN GERMAN GROUNDWATER SITE
SAN GERMAN, PUERTO RICO
Work Assignment No. 075-RDRD-02YP**

**U.S. EPA CONTRACT NO. EP-W-09-002
Document Control No.: 3323-075-03587
July 25, 2018**

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July 25, 2018

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PROJECT: EPA Region 2 RAC2 Contract No.: EP-W-09-002
Work Assignment No.: 075-RDRD-02YP

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SUBJECT: Final Work Plan, Volume 1
San German GW Site
Remedial Design
San German, Puerto Rico

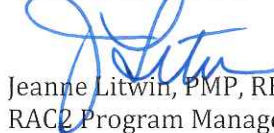
Dear Ms. Eng and Dr. Bosque:

CDM Federal Programs Corporation (CDM Smith) is pleased to submit this Final Work Plan, Volume 1 for the Remedial Design at the San German Groundwater site in San German, Puerto Rico. This work plan is based on the technical scoping meeting held on December 11, 2017 and follow-up meeting on June 25, 2018.

If you have any questions regarding this work plan, please contact me at your earliest convenience at (212) 785-9123.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION



Jeanne Litwin, PMP, REM
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RAC2 Document Control



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VOLUME 1

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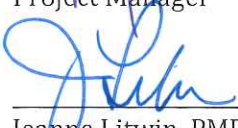
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Acronyms and Abbreviations

1,1-DCE	1,1-dichloroethene
ARAR	applicable or relevant and appropriate requirement
BDR	basis of design report
CCL	CCL Insertco de PR
CDM Smith	CDM Federal Programs Corporation
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
CLP	Contract Laboratory Program
CSM	conceptual site model
DAF	dilution attenuation factor
DNAPL	dense non-aqueous phase liquid
DESA	Division of Environmental Science and Assessment
DPE	dual-phase extraction
DPT	direct push technology
DQO	data quality objective
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
EquIS™	Environmental Quality Information System
FS	feasibility study
GIS	geographic information system
gpd	gallons per day
H&S	health and safety
HASP	health and safety plan
IDW	investigation-derived waste
K _d	site-specific soil-water partitioning coefficient
µg/kg	microgram per kilogram
µg/L	microgram per liter
O&M	operation and maintenance
OU	operable unit
PCE	tetrachloroethene
PDI	pre-design investigation
PID	photoionization detector
PO	Project Officer
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRIDCO	Puerto Rico Industrial Development Company
QA	quality assurance
QAPP	quality assurance project plan
QAS	quality assurance specialist
QC	quality control
QMP	Quality Management Plan
RA	remedial action
RAC	Remedial Action Contract

RAO	remedial action objective
RAS	routine analytical service
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SA	source area
SM	site manager
SOW	statement of work
SVE	soil vapor extraction
TCE	trichloroethene
trans-1,2-DCE	trans-1,2-dichloroethene
UFP	Uniform Federal Policy
VE	value engineering
VOC	volatile organic compound
WA	work assignment
Wallace	Wallace Silversmiths de Puerto Rico, Ltd.

Section 1

Introduction

CDM Federal Programs Corporation (CDM Smith) received Work Assignment (WA) 075-RDRD-02YP under the Remedial Action Contract (RAC) 2 to prepare a remedial design (RD) for the United States Environmental Protection Agency (EPA), Region 2 at the San German Groundwater Contamination Site (the site) located in San German, Puerto Rico. The purpose of this WA is to develop the final plans and specifications, general technical provisions, and special requirements necessary to implement the remedy for Operable Unit (OU) 1 of the site, as specified in the December 2015 Record of Decision (ROD) (EPA 2015). The RD will comprise the basis for the remedial action (RA) to achieve the remediation goals specified in the ROD.

1.1 Background

The site is in San German in southwestern Puerto Rico. Volatile organic compounds (VOCs) have been detected in three public water supply wells: Retiro, Lola Rodríguez de Tío I (Lola I), and Lola Rodríguez de Tío II (Lola II), located near Route 122 between Río Guanajibo and Route 102 (Figure 1-1). These wells were associated with the Puerto Rico Aqueduct and Sewer Authority (PRASA) San German Urbano Water System, which includes a total of seven wells and two surface water intakes.

The Retiro well was located near the intersection of Route 122 and the Río Guanajibo, north of Calle Oriente, along the east side of a narrow, unnamed dirt road that leads to the riverbank. The Retiro well was destroyed when the new bridge across the river was constructed. Lola I is adjacent to Calle Oriente near an entrance to the Lola Rodríguez de Tío public school. Lola II is located approximately 550 feet west-northwest of the Retiro well, south of the Río Guanajibo, on the south side of an unnamed dirt road adjacent to the river. The two Lola wells are no longer active supply wells. The Retiro, Lola I, and Lola II wells acted as an independent interconnected supply system with approximately 800 service connections and served approximately 2,280 users in 2005. According to PRASA, the individual mean output for each well in 2005 was approximately 398,000 gallons per day (gpd) from Retiro, 185,000 gpd from Lola I, and 170,000 gpd from Lola II.

From 2001 to 2005, groundwater samples collected quarterly from the Retiro, Lola I, and Lola II wells regularly exhibited detectable concentrations of tetrachloroethene (PCE) and cis-1,2-dichloroethene (cis-1,2-DCE). The maximum concentrations of PCE and cis-1,2-DCE detected in these wells during this period were 6.4 and 1.2 micrograms per liter ($\mu\text{g/L}$), respectively.

In January 2006, the Retiro well was ordered closed by the Puerto Rico Department of Health due to PCE concentrations exceeding the federal Maximum Contaminant Level of 5 $\mu\text{g/L}$. Around the same time, the Lola I and Lola II wells were taken out of service.

From 2006 to 2008, EPA investigated industrial sites that were potential source areas near the supply well detections and identified several locations to be investigated further. On March 19, 2008, EPA added the San German Groundwater Contamination Site to the National Priorities List.

CDM Smith conducted a remedial investigation (RI) in 2012 to further investigate five potential source areas and determined two lots within the Retiro Industrial Park as the sources of the VOC contamination in groundwater. The two properties were identified as occupied by Wallace Silversmiths de Puerto Rico, Ltd. (Wallace) and CCL Insertco de PR (CCL), now owned by the Puerto Rico Industrial Development Company (PRIDCO) (Figure 1-1). Significant soil contamination of VOCs was detected at these two properties, with generally higher PCE concentrations at Wallace and generally higher trichloroethene (TCE) concentrations at CCL. High vapor concentrations of PCE in sub-slab at Wallace indicate the likelihood of soil contamination underneath the building. Groundwater sampling indicated PCE, TCE, and degradation daughter products, including cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, and 1,1-DCE have migrated from ground surface through the vadose zone and into groundwater. The dissolved contaminants have moved into the saprolite zone (the saturated portion of the unconsolidated zone) and the unknown/unstable zone, which make up the main water-bearing aquifer near the site located below the vadose zone, and follow groundwater flow to the north-northwest toward the Río Guanajibo.

Over the course of the RI and feasibility study (FS) performed from 2012 to 2015, EPA divided the San German Groundwater Contamination Site into two operable units (OU1 and OU2) based on the complexity of geology, hydrogeology, and contamination in soil and groundwater. OU1 addresses identified soil contamination that acts as a continuing source of groundwater contamination, including soil in the vadose zone (above the water table) and soil and highly contaminated groundwater below the water table in the shallow saprolite zone (soils and highly weathered rock). OU2 will address the site-wide groundwater contamination. Contamination in the unstable zone was not well delineated in the OU1 RI (due to borehole collapse when well installations were attempted); therefore, it is investigated under OU2. The conceptual site model (CSM) is shown on Figure 1-2. Additional information regarding site contamination is provided in the CDM Smith RI report (CDM Smith 2015a) and the FS report (CDM Smith 2015b).

At Wallace and CCL, EPA identified five specific source areas (SAs) based on a review of the RI sampling results and past practices for chemical storage and usage. The locations of these SAs are shown with yellow hatching on Figure 1-3.

- Source Area 1 (SA-1) at the Wallace property: This is the approximate area where historical storage of drums was reported. High PCE and TCE concentrations were found in the sub-slab vapor samples in this area.
- Source Area 2 (SA-2) at the Wallace property: Soil contamination and highly contaminated groundwater were found in this area outside the buildings. Residual dense non-aqueous phase liquid (DNAPL) might be present in the clay and silt soil matrix in the vadose zone, in the shallow saprolite zone, and potentially in the unstable zone. An underground drainage pipe may be present here between the two Wallace buildings; the highest surface water PCE concentration was detected at the discharge end of this drainage feature. The area inside the eastern building is where PCE and TCE reportedly were used historically. Extremely high PCE and TCE concentrations were found in the sub-slab vapor samples in this area.

- Source Area 3 (SA-3) at the Wallace property: Within this area, the highest soil PCE concentrations were detected outside the building under a paved area. The PCE concentrations decreased with depth, indicating that most of the contaminant mass is held in the shallow unsaturated clay and silt, likely due to the presence of pavement, which limits infiltration. Because groundwater contaminant concentrations are relatively moderate in this area and soil concentrations decrease with depth, the saprolite zone is not included in this source area to be addressed in the OU1 remedy.
- Source Area 4 (SA-4) at the CCL Label property: This area consists of elevated TCE and cis-1,2-DCE soil contamination. The extent of soil contamination in this area appears to be localized. However, the magnitude of TCE contamination in groundwater at this location makes groundwater part of this source area to be addressed in the OU1 remedy.
- Source Area 5 (SA-5) at the CCL Label property: This area consists of elevated soil TCE contamination and highly contaminated groundwater. The groundwater data also indicate the possibility of residual DNAPL in the shallow saprolite zone.

1.2 Remedial Action Objectives

For OU1, contaminated soil is the medium of interest, specifically contaminated soil in the vadose zone and the contaminated and saturated soil in the shallow saprolite zone below the footprint of the vadose zone contamination. Site-related contaminants are PCE, TCE, and their degradation daughter products, including cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, and 1,1-DCE. The remedial action objectives (RAOs) relating to OU1 as defined in the December 2015 ROD are listed below.

The RAOs for soil are:

- Prevent/minimize contaminated vadose zone soil from serving as a source of groundwater contamination
- Reduce contaminant mass in the saturated shallow saprolite zone soil serving as a source for groundwater contamination

The RAO for soil gas is:

- Reduce contaminant mass serving as a source for current and potential vapor intrusion
- Mitigate impacts to public health resulting from existing, or potential for, soil vapor intrusion

Note: Design for remediating the vadose zone soil and soil gas will need to be coordinated with efforts that EPA may take separately for mitigation of vapor intrusion.

There are no promulgated federal or commonwealth chemical-specific applicable or relevant and appropriate requirements (ARARs) for soil for the site-related contaminants. To meet the RAOs for protection of groundwater, the site-specific impact to groundwater soil cleanup levels was developed. Two parameters are used to develop the soil cleanup levels: the site-specific soil-water partitioning coefficient (K_d) and the dilution attenuation factor (DAF). The average site-

specific soil organic carbon results were used to calculate the site-specific K_d value. A typical DAF value of 20 was used to determine the impact to groundwater contaminant concentrations (See Table 2-3 of the FS report [CDM Smith 2015b]).

The remediation goals for soil are as follows:

- cis-1,2-DCE – 204 micrograms per kilogram ($\mu\text{g}/\text{kg}$)
- PCE – 101 $\mu\text{g}/\text{kg}$
- TCE – 36 $\mu\text{g}/\text{kg}$
- Vinyl chloride – 2 $\mu\text{g}/\text{kg}$
- 1,1-DCE – 35 $\mu\text{g}/\text{kg}$

1.3 ROD Requirements

The ROD-specified remedy for OU1 is soil vapor extraction (SVE) to address soil (vadose zone) source areas, dual-phase extraction (DPE) to address contamination in the shallow saprolite zone, followed by *in situ* treatment of residual contamination.

The major components of the ROD remedy include:

- SVE to target soil source areas in the vadose zone
- DPE to target contamination in the shallow saprolite zone
- *In situ* treatment, such as enhanced anaerobic degradation, as needed to address residual sources
- Installation of additional impermeable cover as necessary for the implementation of SVE
- Institutional controls to restrict contact with contaminated groundwater

Design of the SVE system will need to be coordinated with any measure that EPA may perform for vapor intrusion mitigation. Long-term monitoring of site groundwater will be conducted as part of the OU2 remedy.

Section 2

Work Plan Approach

2.1 Technical Approach to the RD

CDM Smith has developed the technical approach in accordance with the EPA statement of work (SOW), the ROD issued December 11, 2015, the RD/RA Handbook (EPA 1995), and other relevant EPA RD guidance. CDM Smith reviewed available information about the site prior to formulating the scope of work presented in this work plan. A technical scoping meeting was held on December 11, 2017. Input from the technical scoping meeting is incorporated into this work plan.

The RD for the site will include a pre-design investigation (PDI), a treatability study for the SVE and DPE component of the remedy, a treatability study for the *in situ* treatment component of the remedy, and the preparation of design specifications and drawings. The PDI objectives are to:

- Determine areas and depths that will require treatment under OU1
- Refine the CSM based on additional information collected
- Collect site-specific information necessary to support the treatability study and complete the RD (e.g., soil contamination underneath site buildings, physical properties of site soils, and soil oxidant demand)

The major elements of the PDI include:

- Soil boring installation with lithologic logging
- Soil sampling and groundwater screening to refine the nature and extent of contamination
- Completion of a topographic and property boundary survey

The purpose of the treatability study is to collect site-specific parameters for the design of full-scale SVE and/or DPE and *in situ* treatment at the site. The design parameters include but are not limited to SVE flow rates, required SVE vacuum, feasible SVE/DPE radius and zone of vacuum influence, groundwater extraction and/or injection rates, and groundwater flow velocity under both extraction and ambient conditions. The study will evaluate each technology's ability to meet site-specific remedial goals and provide minimum expected treatment requirements for the performance-based design. The treatability study will provide quantitative performance, cost, and design information for the RD.

Design drawings and specifications will be prepared for the SVE/DPE and *in situ* treatment of the residual source contamination. The remedy will be designed to reduce soil contaminant levels to a point where the source zone soils are no longer serving as a source of groundwater contamination or as a source for current and potential vapor intrusion. The design of SVE/DPE will need to be coordinated with other measures EPA may take for vapor intrusion mitigation.

2.2 Project Organization

The proposed project organization is shown on Figure 2-1.

2.3 Project Schedule

A project schedule for the RD is included as Figure 2-2. The project schedule is based on assumptions for durations and conditions of key events occurring on the critical and non-critical paths. These assumptions are as follows:

- Access to all essential properties can be obtained from the property owner in a timely manner.
- Field activities will not be significantly delayed due to severe weather conditions or time-limited access restriction (e.g., hurricanes).
- Data analyzed by EPA's Contract Laboratory Program (CLP) will be received in 72 hours from the time of sample collection for preliminary data for VOCs during the PDI and 6 weeks from the time of sample collection for validated data for all parameters.
- Environmental conditions encountered during the field investigations will not differ significantly from those encountered during the RI and described in the ROD.

2.4 Quality Assurance

All work by CDM Smith on this work assignment will be performed in accordance with the RAC2 Quality Management Plan (QMP) (CDM Smith 2012). The RAC2 quality assurance specialist (QAS) will maintain quality assurance (QA) oversight for the duration of the work assignment. A CDM Smith QAS has reviewed this work plan for QA requirements. A quality assurance project plan (QAPP) governing field sampling and analysis is required and will be prepared in accordance with the Uniform Federal Policy (UFP) for QAPPs and current EPA Region 2 guidance and procedures.

The CDM Smith site manager (SM) is responsible for implementing appropriate quality control (QC) measures on this work assignment. Such QC responsibilities include:

- Implementing the QC requirements referenced or defined in this work plan and in the QAPP
- Adhering to the CDM Smith RAC Management Information System document control system
- Organizing and maintaining WA files
- Conducting planning meetings, as needed, in accordance with the RAC2 QMP (CDM Smith 2018)
- Ensuring the proper data quality objectives (DQOs) are met for the work assignment

Technical and QA review requirements as stated in the QMP will be followed on this WA except that the SM will select reviewers with the experience outlined on the Independent Review Form.

Document control aspects of the program pertain to controlling and filing documents. CDM Smith has developed a program filing system that conforms to EPA's requirements to ensure that the documents are properly stored and filed. This system will be implemented to control and file all documents associated with this work assignment. The system includes document receipt control procedures, a file review, an inspection system, and file security measures.

The RAC2 QA program includes self-assessments as checks on the quality of data generated on this work assessment. Assessments can include quality assessments (such as audits) and technical self-assessments (such as calculation checking, data validation, and project self-assessments). Self-assessments applicable to this assignment include calculation checking.

2.5 Laboratory Accreditation/Certification Requirements

All environmental and analytical laboratories used by CDM Smith under this work assignment will be currently certified or accredited for the matrices and analyses to be conducted. This certification or accreditation will be granted by one of the following accreditation programs: the National Environmental Laboratory Accreditation Program, the American Association for Laboratory Accreditation, another organization that accredits environmental data operations to an international consensus standard and is acceptable to EPA, or the subcontract laboratory that is currently participating in the EPA CLP program. This certification or accreditation will be valid at the time of issuance of this work assignment, and the subcontract laboratory will maintain it through the duration of the work assignment period of performance.

If a laboratory's certification or accreditation is suspended or revoked at any time during the period of performance, CDM Smith will notify the EPA Project Officer (PO) immediately to ensure that any potential effect on the performance of this work assignment is promptly and properly resolved. If certification or accreditation is not available for a field of analysis, CDM Smith will contact the PO prior to performing this analysis to request acceptance of an alternative demonstration of laboratory qualifications. CDM Smith will demonstrate the laboratory's maintenance of these qualifications periodically through the duration of the work assignment performance period as requested by the PO.

2.6 Electronic Data Deliverable Requirements

EPA's standardized electronic data deliverable (EDD) format will be utilized to streamline the electronic submittal of environmental sampling data. CDM Smith will provide electronic submittal of field sampling and laboratory analytical results and geologic data in accordance with Region 2's policies, guidelines, and formats.

2.7 Green Remediation

Green remediation is the practice of considering all environmental effects of the implementation of a remedy and incorporating options to maximize the net environmental benefit of cleanup actions. In accordance with EPA's strategic plan for compliance and environmental stewardship, EPA strives for cleanup programs that use natural resources and energy efficiently, reduce negative impacts on the environment, minimize or eliminate pollution at its source, and reduce waste to the maximum extent possible. EPA's Region 2 Superfund program supports the adoption of "green site assessment and remediation," which is defined as the practice of considering all

environmental impacts of studies, selection, and implementation of a given remedy and incorporating strategies to maximize the net environmental benefit of cleanup actions (see <http://www.clu-in.org/greenremediation>). In addition, EPA established a “Clean & Green” policy to enhance the environmental benefits of Superfund cleanups by promoting technologies and practices that are sustainable.

To the extent practicable, CDM Smith will explore and implement green remediation strategies and applications in the performance of the requirements of this work assignment to maximize sustainability, reduce energy and water usage, promote carbon neutrality, promote industrial materials reuse and recycling, and protect and preserve land resources. CDM Smith will maintain record of green-related activities and report this information to EPA in its monthly progress reports or as requested by the EPA PO.

Potential green remediation practices relevant to RD activities are included in Appendix A. It is anticipated that the following practices will be implemented:

- Obtain materials locally (on the island) when possible
- Work with local staff to reduce fuel consumption/minimize emissions
- Minimize number of field mobilizations
- Minimize the number of sample shipments to the analytical laboratory (while still meeting the holding time requirements)
- Use ultra-low sulfur diesel or fuel-grade biodiesel as fuel, whenever possible
- Use non-phosphate detergents for decontamination
- Use energy efficient lighting and appliances when available
- Investigate options available for using renewable energy

Sustainable practices will be incorporated into the design specifications for implementation during the RA. Practices may include:

- Use treatability study data to optimize the design of the SVE/DPE and *in situ* treatment remedies
- Use *in situ* treatment and natural degradation processes to minimize energy usage and generation of greenhouse gases
- Minimize site disturbance and the construction footprint to the extent possible
- Re-use or recycle demolished site features when possible (e.g., concrete, asphalt, metal)
- Use renewable energy if available or alternatively consider purchase of renewable energy certificates

Section 3

Task Plans

3.1 Task 1 – Project Planning

3.1.1 Project Administration

CDM Smith will provide the following project administration support in the performance of this work assignment.

The SM will:

- Prepare the technical monthly report
- Review weekly financial reports
- Review and update the schedule
- Communicate weekly with the EPA Remedial Project Manager (RPM)
- Prepare staffing plans

The Program Support Office personnel will:

- Review work assignment technical/financial status reports
- Prepare monthly progress reports
- Manage technical resources
- Review the work assignment budget
- Respond to questions from the EPA PO/Contracting Officer
- Prepare monthly invoices

3.1.2 Attend Scoping Meeting

The SM, finance administration manager, project manager, and deputy program manager attended a scoping meeting with EPA Region 2 on October 24, 2017 at the EPA office in New York. Meeting minutes were prepared and submitted to EPA on November 6, 2017.

3.1.3 Conduct Site Visit

The CDM Smith design task manager and SM will conduct a 1-day site visit. The site visit will consist of visual observation of current site conditions and evaluation of potential logistical and health and safety (H&S) issues. The site visit also will assess potential staging area locations, PDI sampling locations, and structures potentially obstructing access for the field activities. A memorandum summarizing the visit and any recommendations for potential additional field

reconnaissance activities will be submitted to EPA. The memorandum will include photographs taken during the visit and a photolog.

3.1.4 Prepare Draft Work Plan and Budget

CDM Smith has prepared this draft RD work plan in accordance with the contract terms and conditions. The work plan includes CDM Smith's technical approach for each task to be performed, a description of the work products that will be submitted to EPA, a proposed project schedule, and a list of key personnel performing work on the project. The draft work plan budget contains a detailed cost breakdown, by subtask, of the direct labor costs, subcontractor costs, other direct costs, and all other specific cost elements required for performance of each of the subtasks included in the SOW.

3.1.5 Negotiate and Revise Draft Work Plan/Budget

CDM Smith personnel will attend a work plan negotiation meeting at EPA's direction. EPA and CDM Smith personnel will discuss and agree upon the final technical approach and costs required to accomplish the tasks detailed in the work plan. CDM Smith will submit a negotiated work plan and budget, incorporating the agreements made in the negotiation meeting.

3.1.6 Evaluate Existing Data and Documents

CDM Smith will review existing site background information and documentation. CDM Smith's review is expected to include the following documents:

- EPA ROD, dated December 11, 2015
- CDM Smith RI report, dated July 24, 2015
- CDM Smith FS report, dated July 22, 2015
- Files and records from the U.S. Geological Survey, U.S. Army Corps of Engineers, and other federal sources
- Puerto Rico Environmental Quality Board files and records

Review of property ownership and access agreements will be performed as part of the mobilization activities described in Section 3.3.2.

3.1.7 Quality Assurance Project Plan

CDM Smith will, to the extent possible, revise and update the existing Quality Assurance Project Plan (QAPP) as necessary to cover the requirements for development of the RD, with activities expected to include a PDI and the treatability study. The site-specific QAPP will be prepared in accordance with EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans (EPA 2006); Uniform Federal Policy for Quality Assurance Project Plans (EPA 2005b); Revision 1, Optimized UFP-QAPP Worksheets (EPA 2012); current EPA Region 2 RAC QAPP procedures; and CDM Smith's current approved QMP for this contract (January 2018).

The site-specific QAPP will reference the CDM Smith generic QAPP, dated December 2013 (or latest version), whenever possible. Draft and final versions of the PDI QAPP will be prepared prior to PDI activities.

3.1.8 Health and Safety Plan

CDM Smith will revise and update the health and safety plan (HASP) used for Work Assignment 039-RICO-02YP to cover the current requirements for the PDI and update the HASP for the treatability study during the RD. The HASP will be in accordance with Subpart B, Section 150, “Worker health and safety,” of the National Contingency Plan at 40 Code of Federal Regulations (CFR) 300.150 and with 29 CFR 1910.120 (1)(1) and (1)(2).

3.1.9 Non-RAS Analyses

Samples collected during the PDI and treatability study are anticipated to be analyzed by EPA’s Division of Environmental Science and Assessment (DESA) or CLP laboratories. Non-routine analytical services (RAS) analyses for geotechnical parameters and soil oxidant demand tests, using ASTM International methods, will be conducted by CDM Smith’s laboratories.

3.1.10 Meetings

CDM Smith will participate in progress meetings and teleconferences over the course of this work assignment. The meetings are assumed to be held at the EPA offices in San Juan, Puerto Rico. Meeting minutes will be prepared and submitted by CDM Smith to EPA within 5 calendar days after each meeting.

3.1.11 Subcontractor Procurement

This subtask will include the procurement of all subcontractors required to complete the PDI. The following subcontractors will be procured:

- A driller to install soil and groundwater screening borings and wells
- A Puerto Rico-licensed surveyor to perform site topographic and property boundary survey
- A subcontractor responsible for the removal and proper disposal of investigation-derived waste (IDW). IDW will consist of both liquids and solids.

Procurement of the treatability study subcontractors is included under Section 3.7.3.

3.1.12 Perform Subcontract Management

CDM Smith will perform the necessary oversight of the subcontractors needed to perform the RD. CDM Smith will institute procedures to monitor progress and maintain systems and records to ensure the work proceeds according to the subcontract and RAC2 requirements. CDM Smith will review and approve subcontractor invoices and issue any necessary subcontract modifications.

3.2 Task 2 – Community Relations

CDM Smith will provide technical support to EPA during the performance of the following community involvement activities throughout the RD in accordance with the EPA Superfund Community Involvement Handbook (EPA 2005a).

3.2.1 Community Interviews

Per the EPA SOW, this subtask is not applicable.

3.2.2 Community Involvement Plan

Per the EPA SOW, this subtask is not applicable.

3.2.3 Public Meeting Support

CDM Smith will support EPA at public meetings, availability sessions, and/or open houses. CDM Smith will reserve the meeting space, prepare for and attend the meetings, prepare meeting summaries, prepare draft visual aids, reserve court reporters, and maintain sign-in sheets. Handouts will be in both English and Spanish.

3.2.4 Fact Sheet Preparation

CDM Smith will prepare a draft fact sheet for the public meeting. The 2- to 4-page fact sheet, with three illustrations, will be written in both English and Spanish. CDM Smith will prepare the final fact sheet that incorporates all EPA comments.

3.2.5 Public Notices

CDM Smith will develop public notice/newspaper announcements as necessary to support the public meetings, availability sessions, and/or open houses and arrange for the notices to be run in the two most widely read local newspapers. The notices/announcements will be prepared in both English and Spanish.

3.2.6 Site Mailing List

Per the EPA SOW, this subtask is not applicable.

3.3 Task 3 – Data Acquisition

A PDI will be performed to collect data required to complete the RD. The PDI activities are described below.

3.3.1 Site Reconnaissance

Site reconnaissance activities will include the site survey during which topography, property boundary, utility, and right-of-way information will be collected. The site survey will be performed by a surveying subcontractor for precise characterization of site features pertinent to the PDI, treatability study, and RD (such as vegetation and underground piping that may obstruct installations, staging, or access).

CDM Smith will obtain access and provide oversight during the survey fieldwork and take representative photographs to document field activities and significant events or observations made. It is assumed that property owners will provide CDM Smith with access necessary to conduct the survey work.

CDM Smith will coordinate with the occupants of the Wallace building to perform site reconnaissance of the interior of the building to determine the suitable sample locations and operation hours for the PDI and treatability study.

3.3.2 Mobilization and Demobilization

This subtask will consist of property access assistance; field personnel orientation; field office and equipment mobilization and demobilization; ordering, staging, and transporting field supplies to the site; leasing temporary facilities; establishment of health and safety zones; and installation of utilities, if needed.

EPA, with the support of CDM Smith, will confirm if the existing access agreement with Wallace is up-to-date and includes PDI-related activities (drilling and sampling). EPA will amend access agreements as needed and obtain a new one for the CCL lot, now owned by PRIDCO. CDM Smith will communicate to EPA the activities expected to be performed during the PDI for inclusion in access agreements.

After the completion of fieldwork, all equipment and supplies will be removed from the site, and all properties will be restored to pre-work conditions to the extent practical. CDM Smith will maintain photographic documentation of site conditions throughout the duration of the field activities.

3.3.3 Hydrogeological Assessment

CDM Smith will perform a hydrogeological assessment to determine the hydrogeological properties of the shallow saprolite zone through an aquifer test. New monitoring wells will be installed in the shallow saprolite zone, and both existing wells and new wells will be used for the aquifer test.

Monitoring wells will also be installed into the unstable bedrock zone at both Wallace and CCL to determine the lateral and vertical extents of groundwater contamination to support the design of the OU1 remedy and for evaluation of opportunities to integrate and optimize remedial design and remediation of OU1 and OU2. Additionally, groundwater screening samples will be collected for fast-turn around VOC analysis by CLP. Locations and construction details of the unstable bedrock wells are presented in Figure 3-1 and Table 3-1.

3.3.4 Soil Boring, Drilling, and Testing

Soil borings will be conducted in areas where additional data are needed to delineate the lateral and vertical extents of the treatment area. Groundwater screening samples also will be collected from each boring. Borings will be advanced indoors and outdoors in locations to further delineate each source at Wallace (SA-1, SA-2, and SA-3) and each source area at CCL (SA-4 and SA-5). The proposed soil boring locations are presented on Figures 3-2 and 3-3.

The borings will be performed using the direct-push technology (DPT) rig. All borings conducted using DPT will be advanced to refusal, which is likely at the unstable zone, or perhaps shallower. Continuous dual core sampling for lithologic logging and photoionization detector (PID) readings will be performed at all borings. A grab groundwater sample will be collected at the refusal of each boring.

Soil sampling will be conducted at 4-foot intervals. The depths for soil sample collection will be biased to the highest PID reading within each sample interval. All samples will be analyzed for VOCs with 72-hour quick turnaround preliminary data requested. The preliminary data will be

used to determine if additional boring locations will be required to delineate the contamination as necessary to complete the design. If required, additional boring locations will be installed during the same mobilization.

Selected boring samples will be analyzed for geotechnical parameters such as grain-size, porosity, and soil oxidant demand. The samples will be collected across the site from the proposed borings to determine the range of soil physical properties that exist at the site.

Health and safety air monitoring will be performed as necessary throughout the field activities.

3.3.5 Environmental Sampling

Groundwater and soil samples are included under Sections 3.3.3 and 3.3.4, respectively.

3.3.6 Geotechnical Survey

Per the EPA SOW, this subtask is not applicable.

3.3.7 IDW Characterization and Disposal

CDM Smith will procure a subcontractor (see 3.1.11) for removal and proper disposal of all field-generated waste soils, liquids, solids, and personal protective equipment. Representative waste samples will be collected and analyzed by a laboratory to characterize the IDW. CDM Smith will conduct field oversight and H&S monitoring during all waste disposal activities. In accordance with RAC2 contract requirements, CDM Smith will review and sign the required waste manifests on behalf of EPA.

3.4 Task 4 – Sample Analysis

3.4.1 Innovative Methods/Field Screening Sample Analysis (Optional)

This subtask addresses innovative methods and field screening sample analysis for soil samples. This subtask is an optional requirement. If EPA determines that performance of this subtask is necessary, EPA will issue a WA amendment to implement these requirements into this work assignment.

3.4.2 Analytical Services Provided via CLP or DESA

The types and quantities of analyses are described in Work Plan Volume 2. Samples will be analyzed in compliance with Field and Analytical Services Teaming Advisory Committee procedures. It is assumed that all RAS samples collected during the PDI and treatability study will be analyzed by a CLP laboratory or the DESA laboratory.

3.4.3 Non-Routine Analytical Services

As described in Section 3.4.2, it is anticipated that all samples collected during the PDI and treatability study will be analyzed by DESA or a CLP laboratory, except for soil oxidant demand and the geotechnical samples, which will be performed by the CDM Smith treatability study laboratory and geotechnical laboratory.

3.5 Task 5 – Analytical Support and Data Validation

3.5.1 Coordination with Appropriate Sample Management Personnel

CDM Smith will perform the following activities:

- Create a field database tracking system using Scribe to create chain-of-custody forms and facilitate tracking of sample information.
- Book the analytical laboratories through the EPA Regional Sample Control Center. CDM Smith will coordinate sample tracking prior to and after sampling events, coordinate CLP samples numbers, and resolve laboratory questions and issues. It is assumed that fieldwork for PDI will consist of one sampling event, and fieldwork for treatability study will consist of six sampling events.
- A trip report will be submitted for each CLP case. Six CLP cases are assumed.
- For each sample delivery group, the analytical services coordinator will receive and review each data package for completeness, update the sample tracking database, verify EDDs, photocopy data packages, and obtain document control numbers for data storage purposes.

3.5.2 Data Validation

All analytical data from CLP and laboratories will be validated by EPA. Analytical data from DESA will be validated by DESA. CDM Smith does not anticipate performing data validation.

3.6 Task 6 – Data Evaluation

This subtask will include efforts related to compilation of the analytical and field data collected during the PDI field activities. The PDI data will be loaded into CDM Smith's Environmental Quality Information System (EQuIS™) database to meet EPA Region 2 EDD requirements.

3.6.1 Data Usability Evaluation

CDM Smith will evaluate the usability of the analytical data from the PDI and the treatability study separately, including any uncertainties associated with each set of data. The data validation reports will be reviewed, and field sampling techniques, laboratory analytical methods and techniques, audit results, and data validation will be considered in evaluating the usability of each set of data. The usability of each set of data will be evaluated using the DQOs defined in the QAPP.

A data usability summary report will be prepared for the PDI analytical data and will be included as part of the data evaluation report.

A separate data usability summary report will be prepared for the treatability study analytical data and included as an appendix to the treatability study report (Section 3.7.4).

3.6.2 Data Reduction, Tabulation, and Evaluation

This subtask will include reduction, tabulation, and evaluation of the data collected during the field activities.

Data Management

The PDI and treatability study data will be stored in EQuIS and can be exported, as required, to support the analysis and presentation of data using gINT, Microsoft Excel, ArcMAP geographic information system (GIS) software, AutoCAD, and other applications.

Database management activities will be performed for the samples collected during the field activities. The information will be uploaded into the EQuIS database and will include field sample information (e.g., date/time of sample collection, depth interval, analysis performed, sample type, and parent sample), the sample elevation and coordinates, and the analytical results (including QC samples).

Soil Boring Logs

Lithologic data from soil and groundwater screening borings will be used with gINT software to complete soil boring logs and cross sections. CDM Smith will complete data logs for all soil and groundwater screening borings and well installation.

GIS and Figures

CDM Smith will update the GIS created during the RI/FS with information obtained during the field activities. GIS will be used to conduct spatial analysis of the data and develop figures for reports and presentations, including the data evaluation report and design reports.

Electronic Data Deliverable

CDM Smith will prepare an EDD in accordance with EPA Region 2 EDD requirements. The EDD will include the analytical and field data developed during the RD.

3.6.3 Data Evaluation Report

CDM Smith will prepare a data evaluation report summarizing the information gathered during the PDI field activities, its relation to the refinement of the nature and extent of the vadose zone soil contamination and contamination in the shallow saprolite zone, and how the data will impact the remedial design. The current CSM will also be refined and described.

CDM Smith will evaluate and present results of the PDI using preliminary analytical data at a meeting to be arranged through the EPA RPM. The purpose of the meeting will be to determine if the extent of OU1 treatment zone is fully delineated and if any additional data need to be collected.

3.7 Task 7 – Treatability Testing and Pilot Testing (Optional)

This task will include efforts related to the treatability study that will be conducted to provide quantitative performance, cost, and design information for the RD.

3.7.1 Literature Search

CDM Smith will research *in situ* treatment technologies that may be applicable to the contaminants of concern and the site conditions encountered. The approach to the treatability study will be based on the results of this literature search.

3.7.2 Treatability Study Work Plan

CDM Smith will prepare a treatability study work plan, which will outline the detailed procedures for the work. The plan will include design details for conducting a pilot study for SVE, DPE, and *in situ* treatment components of the OU1 remedy. The work plan will include detailed descriptions of the following:

- The goals of the pilot study
- The OU1 pilot system and equipment procedures to be used for field sampling and measurements
- The DQOs of the pilot study
- The locations to install shallow SVE testing wells, deep SVE or DPE testing wells, and *in situ* treatment wells for the study
- The estimated duration for each type of test
- The procedures for sampling and measurement
- The methods to be used for sample analyses
- The quality assurance/control methods to be used
- The engineering calculations to be used for interpreting field data and measurements and evaluating the performance of the study
- The procedures for treatment and disposal of all material generated during the pilot tests

The treatability study work plan will describe in detail the treatment processes and how the proposed technologies will be tested for the evaluation of their capability in meeting the performance standards for the site. The treatability study work plan will address how the proposed technologies will meet all disposal requirements, including methods for treatment and disposal of all material generated during the testing.

The work plan will include a schedule for performing the treatability study, with specific dates for each task and subtask, including specified dates for procurement of subcontractors, sample collection, sample analysis, and preparation of the treatability study report.

CDM Smith will submit a draft treatability study work plan for review by EPA in accordance with the approved project schedule and a final treatability study work plan, incorporating EPA's review comments.

3.7.3 Conduct Treatability Study

Although SVE, DPE, and *in situ* treatment have been shown to be effective in removal of VOCs from soil and groundwater, it is important to gather site-specific design parameters essential to the design of the full-scale remedy (such as SVE/DPE well spacing and location, target depths, design flow rates, and injection and extraction flow rates).

The source areas present special challenges for implementing remedial technologies as described below:

- TCE and PCE were released at several locations due to past site operation and resulted in several source areas.
- TCE and PCE were held in the vadose zone and penetrated through the vadose zone and into groundwater.
- Based on subslab vapor sampling data, soil contamination exists beneath the Wallace buildings and likely beneath the CCL building.
- The soil lithology logs showed silty clay and clay at shallow depths and an increase of sand and rock fragments at deep depths. This means that the permeability is low at shallow depths, with increasing permeability as depth increases.
- The groundwater at the source area is semi-confined. Borings drilled during the RI showed the vadose zone to be approximately 20 feet bgs before reaching the saturated zone; however, once the borings were drilled to the saturated zone, the groundwater had risen in the borehole. The depth to water in monitoring wells installed at the source area varied from 5 to 13 feet bgs.
- The saturated shallow saprolite zone is contaminated at the source area and is less permeable than the contaminated unstable zone below it. The unstable zone will be addressed under OU2; however, groundwater in the shallow saprolite zone and the unstable zone are connected.

The OU1 ROD specified SVE, DPE, and *in situ* treatment, as necessary, to remediate the source area contamination. To design these remedial technologies effectively, site-specific design parameters need to be collected. These include but are not limited to:

For SVE and DPE:

- Achievable air flow rate and subsurface vacuum in the vadose zone for the design of vacuum blower
- The effective zone or radius of influence induced by the applied vacuum for the design of vapor extraction well spacing
- The rate of moisture production during SVE/DPE
- Extracted contaminant concentrations

For DPE and *in situ* treatment:

- The groundwater hydraulic conductivity for estimating groundwater extraction rates (for recirculation of amendment)

For *in situ* treatment:

- Amendment distribution characteristics in the shallow saprolite zone
- Achievable amendment injection rate
- Amendment longevity

To collect these parameters, the site-specific conditions that need to be considered are as follows:

- Due to the vertical changes of lithology, the air permeability and achievable air flow rate in the shallow vadose zone is anticipated to be less than the deep vadose zone. A typical SVE system that utilized extraction wells that were screened across the entire vadose zone would result in preferential air extraction from the deep zone and inadequate vapor extraction in the shallow zone. Therefore, it is beneficial to test the air permeability and air flow within the shallow vadose zone and the deep vadose zone separately.
- Due to the semi-confined nature of the shallow groundwater, applying a vacuum could draw water up and limit the air flow more than an unconfined aquifer. Investigating the site-specific depth that SVE can be used without DPE would minimize costs in treating extracted water and disposing of treated water.
- Vertical distribution of soil contamination varies from area to area. Current available data only indicated three locations where soil contamination penetrated the entire vadose zone. In areas that soil contamination has not penetrated the entire vadose zone, if the applied vacuum for SVE does not draw groundwater up to interfere with the performance of the SVE, then DPE may not be necessary.
- The hydrogeological character of the shallow saprolite zone needs to be determined for estimating the amount of water that may be extracted for dewatering in a DPE system or for estimating the potential for amendment distribution if *in situ* treatment is applied. The aquifer test that will be performed to understand hydraulic conductivities in this zone needs to be carefully designed so that data are collected from the shallow saprolite zone, not from the unstable zone, which is more permeable than the shallow saprolite zone and will be addressed under OU2.
- Space and access for remediation could be limited and restrained because (1) soil contamination is most likely located underneath the buildings; (2) Wallace is an active facility, and the investigation and pilot testing activities need to be coordinated with the operation of the facility; and (3) access to the most contaminated areas within the building may be limited.

With consideration to the above site-specific characteristics and constraints, CDM Smith expects to conduct the treatability study in three phases (as tentatively shown on Figure 3-3) as follows:

- **Phase 1 – Shallow SVE Test** will test the air flow rate, the applied vacuum, and the zone or radius of vacuum influence through the shallow (saprolite) vadose zone where the predominant lithology consists of silt and clay. Potential impact on water table also will be evaluated.

- **Phase 2 – Deep SVE (or DPE) Test** will test the dewatering of the shallow saprolite zone and the air flow rate, the applied vacuum, and the zone or radius of vacuum influence through the deep vadose zone, which contains increasing levels of sand and rock fragments.
- **Phase 3 – *In situ* Treatment Test** will test the amendment distribution through the shallow saprolite zone underneath the footprint of the vadose zone contamination. The exact treatment system (e.g., organic amendment distributed through a circulation system) will be developed based on the literature review and the PDI data. *In situ* treatment during Phase 3 test will also reduce contaminant mass within the treatment zone and provide site-specific valuable information for OU2.

Shallow and deep SVE testing wells, with associated vapor monitoring points, will be installed to monitor the performance of the Phase 1 and Phase 2 pilot tests. The locations of the testing wells will be determined based on RI and PDI data on distribution of soil contamination.

Additional injection wells, extraction wells, and monitoring wells will also be installed to perform the Phase 3 *in situ* treatment pilot test. The location of the wells will be determined based on OU1 and OU2 RIs and PDI data. Wells will be installed in both the shallow saprolite zone and the unstable bedrock zone for the pilot study. Groundwater samples will be collected to assess the performance of the pilot tests. Samples are expected to be analyzed for total organic carbon, VOCs, and groundwater geochemistry parameters, such as nitrate/nitrite, ferrous iron, sulfate, and methane/ethane/ethene. Groundwater purging parameters, such as dissolved oxygen, oxidation-reduction potential, pH, and temperature, will also be recorded. CDM Smith will procure subcontract services needed to support the treatability study.

It should be noted that the three-phase pilot study approach will require timely adjustments based on the cumulative site-specific information collected and will provide site-specific knowledge on how these three technologies can be implemented collectively. For example, the Phase 2 approach may be adjusted based on data collected in Phase 1, and the Phase 3 approach may be adjusted based on the results of Phase 1 and Phase 2.

CDM Smith will dispose of waste generated during the treatability study as noted in Section 3.3.7.

3.7.4 Treatability Study Report

CDM Smith will submit a report summarizing the results and conclusions of the treatability study. The report will describe the performance of each pilot test at the treatment durations and the parameters tested and compare the results to the performance standards established for the site. The report will also evaluate the effectiveness, implementability, and cost of each tested technology. Final results will be compared with the predicted results. In addition, the report will evaluate full-scale application of the technologies and identify the key parameters that would affect full-scale operations. The treatability study report will present the following:

- If the goals of the pilot study were achieved
- A description of all the work performed
- A summary and discussion of any deviations from the treatability study work plan

- A discussion and evaluation of the results based on engineering calculations and trend analyses
- A summary of quality assurance and quality control activities and results
- Conclusions and recommendations regarding the performance of the treatability study and the technical basis for design and implementation of a full-scale treatment approach

CDM Smith will submit a draft treatability study report for review by EPA in accordance with the approved project schedule and a final treatability study report, incorporating EPA's review comments.

3.8 Task 8 – Preliminary Design (Optional)

3.8.1 Preliminary Design

The preliminary design begins with the initial design and ends with the completion of 30% of the design effort. CDM Smith will develop the design approach along with supporting data and documentation that define the functional aspects of the project and demonstrate conclusively that the completed project will be effective in meeting the remediation goals and ARARs. It is anticipated that the SVE, DPE, and *in situ* treatment components of the remedy will be designed using a combination of prescriptive and performance-based design approaches. The RA subcontractor will be responsible for developing and executing the detailed design. The performance-based design requirements will be developed based on industry standards and technical considerations specific to the site. A conceptual baseline design for each treatment component will be developed, which will establish minimum construction standards and provide the basis for RA construction.

The preliminary design will include:

- A summary of the completed PDI activities and results
- A summary of the completed treatability study activities and results
- A discussion of how the remedial design will achieve the performance standards through the series of remedy components
- A description of any variances to the ROD
- Technical factors relating to implementation of the remedy, including environmental control measures, constructability, and acceptable construction practices and techniques
- Preliminary drawings, including site layout, treatment areas for each technology, and a preliminary process and instrumentation diagram
- Plan for minimizing impact to the public and the environment during implementation
- A plan for satisfying permitting requirements
- A general specification outline that will cover all specifications to be prepared and used

- A draft schedule for RA activities, including sequencing of the remedy components
- Details of how the remedial action will satisfy the requirements of EPA Region 2's Clean & Green Policy

A preliminary design review meeting will be held to present and discuss the preliminary design approach with EPA.

This task will include resolving EPA's and other stakeholders' comments on the preliminary design.

CDM Smith will provide support for a value engineering (VE) screening of the preliminary design. The VE screening will include an evaluation of cost and function relationships, concentrating on the high cost areas of the remedy.

3.9 Task 9 – Equipment, Services, and Utilities

Per the EPA SOW, this subtask is not applicable.

3.10 Task 10 – Intermediate Design

Per the EPA SOW, this subtask is not applicable.

3.11 Task 11 – Pre-Final and Final Design (Optional)

3.11.1 Pre-Final Design Specifications and Drawings

CDM Smith will submit a basis of design report (BDR) and a complete set of construction drawings and specifications (general specifications, drawings, and schematics) at the pre-final stage. The pre-final design will incorporate any feedback received during the review of the preliminary design and clearly show any modifications of the design resulting from incorporation of the review comments.

The final design plans and specifications will be consistent with the technical requirements of all ARARs. The design will include a technical specification for photographic documentation of the RA construction work. Any offsite disposal requirements will comply with the policies stated in the "Procedures for Planning and Implementing Off-Site Response Actions" (see CFR § 300-440) and other applicable guidance. The specifications will conform to the Construction Specifications Institute format.

The BDR will describe the design assumptions and parameters and include a discussion of the design criteria and objectives, with emphasis on the capacity and ability of the RD to achieve the design objectives set forth in the 2015 ROD. The report will include detailed calculations and documentation supporting how the plans and specifications will meet the ROD requirements. The BDR will include a summary of all items discussed as part of the preliminary design meeting.

This subtask includes technical support for permitting and land acquisition, leasing, or easements as required for the remedy.

CDM Smith will utilize a Technical Review Committee to conduct technical review. Before submitting the project specifications, CDM Smith will coordinate and cross-check the specifications and drawings and complete proofreading of the edited specifications and the cross-checking of all drawings and specifications.

A VE study, if the value engineering screening identifies potential cost savings for the RA, may be conducted if necessary.

3.11.2 Pre-Final RA Cost Estimate

CDM Smith will prepare a definitive cost estimate, covering each work item and activity of the RA, based on definitive engineering data, with a target accuracy of plus 15 to minus 5%. As part of this definitive cost estimate, CDM Smith will prepare a range estimate and analysis of the project's potential scope, cost, and schedule change during the RA presented by work activity. CDM Smith will include one copy of the quantity takeoff sheets, including all appropriate items, with each estimate submitted and provide a detailed description of the basis for development of all unit prices used in the estimate.

3.11.3 Pre-Final Design Review Meeting

CDM Smith will participate in a meeting with EPA after completion of the pre-final design. It is assumed that the meeting will be held at the EPA Region 2 offices in San Juan, Puerto Rico and New York City, New York. CDM Smith will resolve EPA's and other stakeholders' review comments prior to incorporating changes into the final RD.

3.11.4 Prepare Final Design Submittal

CDM Smith will prepare the 100% design submittal, incorporating all comments and/or changes recommended in the pre-final/final design review meeting, including the final cost estimate and a schedule for execution of the RA. All final design documents will be approved, signed, and sealed by a Professional Engineer registered in the Commonwealth of Puerto Rico. The final design documents will include the following:

- Final review of constructability, operability, biddability, environmental measures, and claims prevention as well as documentation of the results
- A revised project delivery strategy, if necessary

3.11.5 RA Subcontract Documents

Per the EPA SOW, this subtask is not applicable.

3.11.6 Operation and Maintenance Plan

This subtask includes preparation of an operation and maintenance (O&M) plan that includes a description of normal operation and maintenance procedures of each O&M task. The O&M plan will include a specific description of system equipment, a description of records and reporting mechanisms needed for proper O&M, quality assurance procedures, health and safety requirements, and a description and schedule of the specific corrective actions to be implemented if the system criteria are not met.

3.12 Task 12 – Post-Remedial Design Support (Optional)

This task covers activities in support of the solicitation of a contract for construction and implementation of the remedial action implementing this remedial design. This task begins with EPA's approval of remedial design and subcontract solicitation documents prepared under Task 11 and ends with the issuance of the solicitation for the remedial action subcontract. Task 12 is an optional requirement. If EPA determines that performance of this subtask is necessary, EPA will issue a WA amendment to formally implement these requirements into this work assignment.

3.12.1 Update Site-Specific Plans (Optional)

CDM Smith will review and update the site-specific plans supporting and documenting requirements for the final remedial design as necessary to ensure that these requirements are up-to-date and in accordance with the requirements for implementation of the remedial action at this site. The plans covered by this subtask include the RA construction quality assurance plan, HASP, sampling and analysis plan, site management plan, pollution control and mitigation plan, transportation and disposal/waste management plan, data management plan, and other plans, as applicable, that will need to be revised to describe EPA's up-to-date requirements for the remedial action. EPA remains responsible for determining and defining the nature and scope of any changes required for the final remedial design and approving these changes. At the direction of EPA, CDM Smith will participate in meetings with EPA to review the requirements of the remedial design based on issues raised during the final design review.

3.12.2 Pre-Solicitation Activities (Optional)

Per the EPA SOW, this subtask is not applicable.

3.13 Task 13 – Work Assignment Closeout

3.13.1 Document Indexing

CDM Smith will organize the WA files in its possession in accordance with the currently approved file index structure. The file index will list all final deliverables, work assignment amendments, and working files concerning technical decisions. The index will be sorted chronologically by date (from earliest to latest), include a brief description of each document, and include the document sender and recipient.

3.13.2 Document Retention/Conversion

All relevant paper files will be converted to the appropriate long-term storage format. The project files will be delivered to the EPA Records Center when the work assignment is complete.

Section 4

References

CDM Smith. 2015a. Final Remedial Investigation Report. San German Groundwater Contamination Site, San German, Puerto Rico. July.

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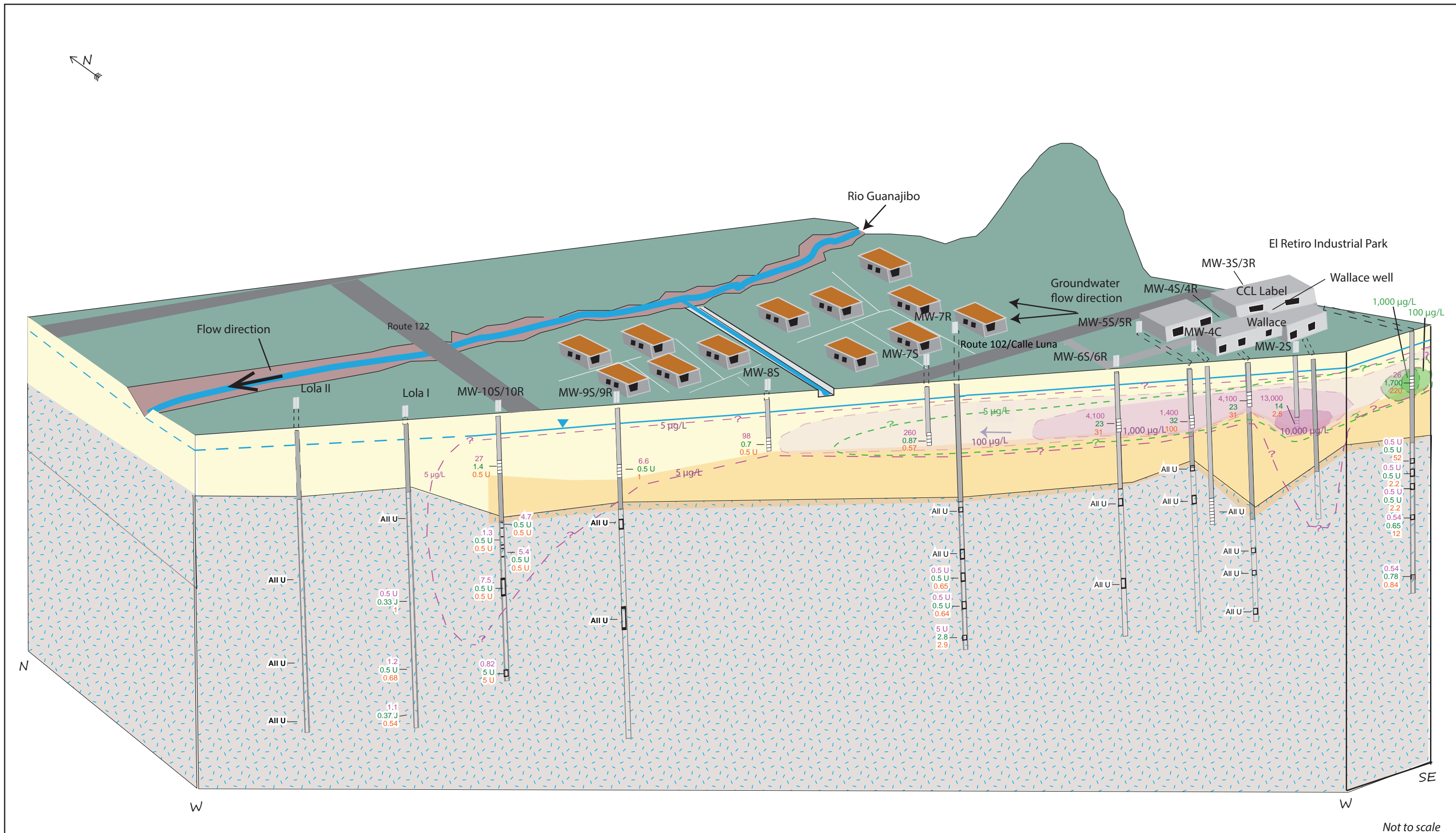
Figures



1,000 0 500 1,000

Approximate Scale (in feet)

Figure 1-1
Site Map
San German Groundwater Contamination Site
San German, Puerto Rico



Legend

- Unconsolidated zone
- Serpentine Bedrock

- Contaminant flow path
- Groundwater level

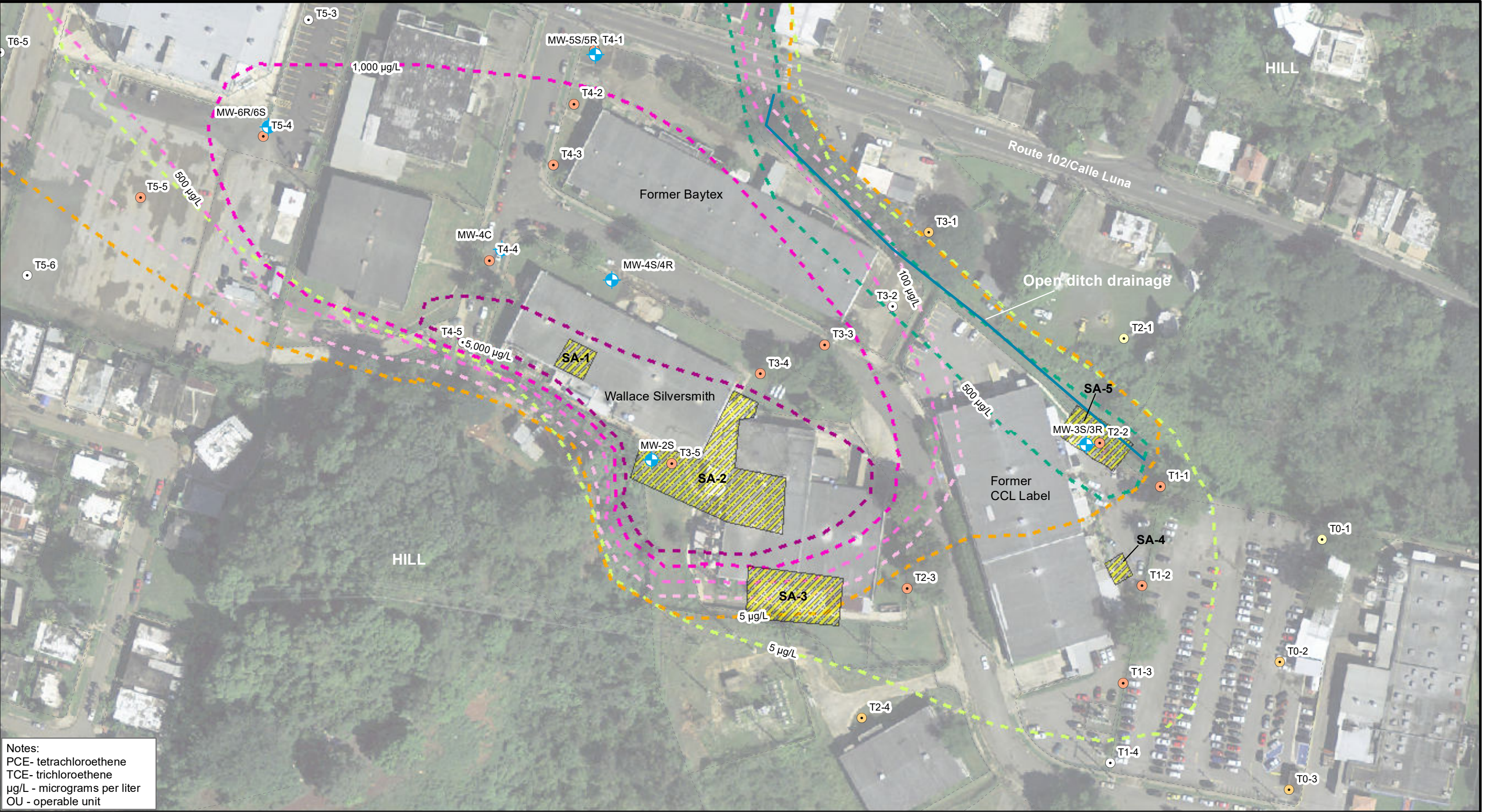
- Tetrachloroethene (PCE) contamination plume
- Trichloroethene (TCE) contamination plume
- Unknown/unstable zone

1.3 - Tetrachloroethene detection
2.8 - Trichloroethene detection
2.9 - cis-1,2-Dichloroethene detection
U - Not detected
Concentrations in micrograms per liter

Figure 1-2
Conceptual Site Model
San German Groundwater Contamination Site
San German, Puerto Rico



Not to scale



Notes:
PCE- tetrachloroethene
TCE- trichloroethene
µg/L - micrograms per liter
OU - operable unit

- LEGEND**
- Monitoring well
 - OU-1 Groundwater screening dry location
 - SA-1 - Source area 1, estimated
 - OU-1 Groundwater screening location having detections above MCLs
 - OU-1 Groundwater screening location having detections below MCLs
 - OU-1 Groundwater screening location having no detections

- PCE- tetrachloroethene**
- Contour line for 5,000 µg/L
 - Contour line for 1,000 µg/L
 - Contour line for 500 µg/L
 - Contour line for 100 µg/L
 - Contour line for 5 µg/L

- TCE- trichloroethene**
- Contour line for 500 µg/L
 - Contour line for 5 µg/L
- 0 45 90 180 Feet

Figure 1-3
Contamination Source Areas
San German Groundwater Contamination Site
San German, Puerto Rico

Figure 2-1
San German Groundwater Site OU1 Remedial Design
Project Organizational Chart

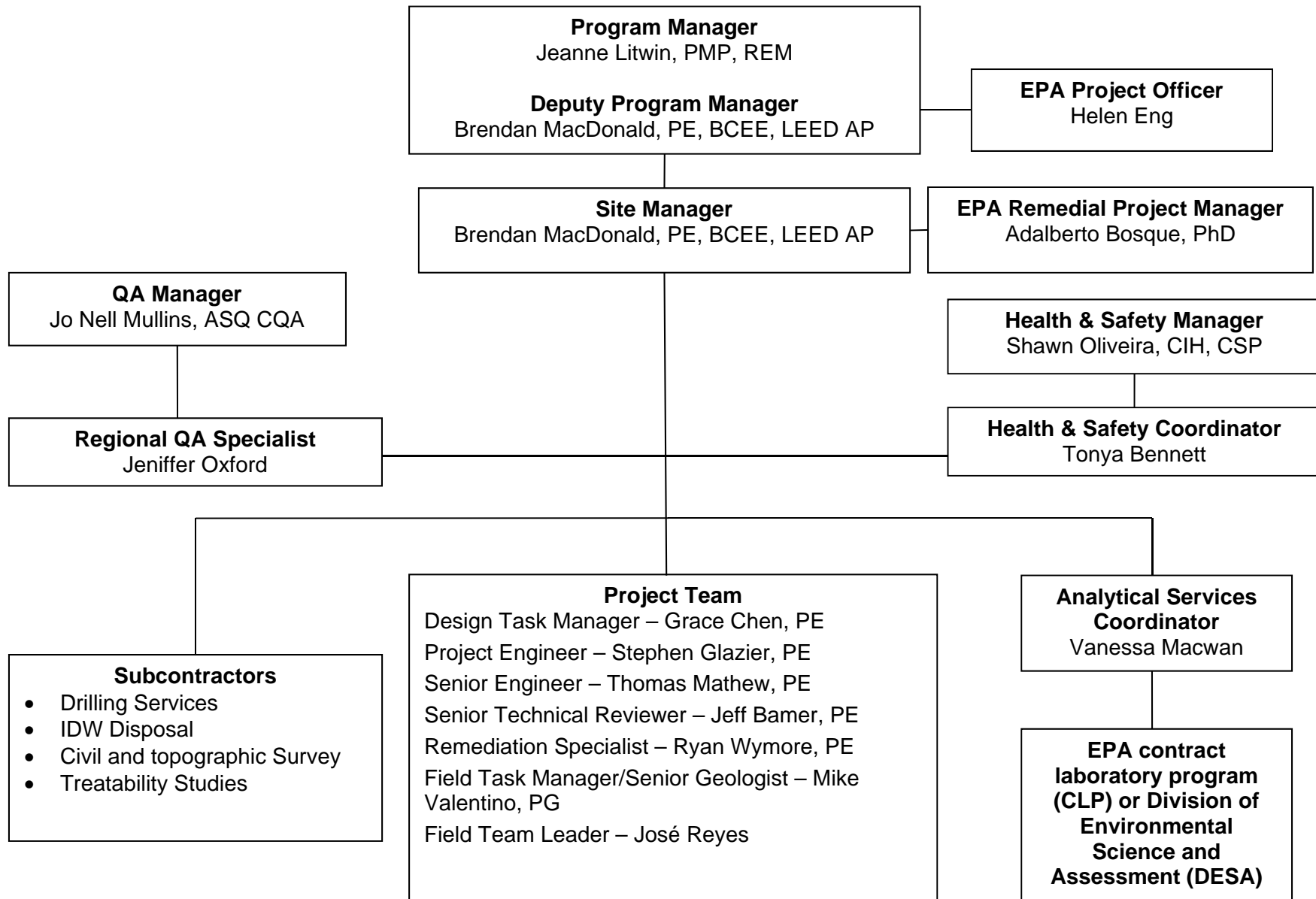


Figure 2-2
San German Contaminated Groundwater Site OU1 Remedial Design Schedule
San German, Puerto Rico

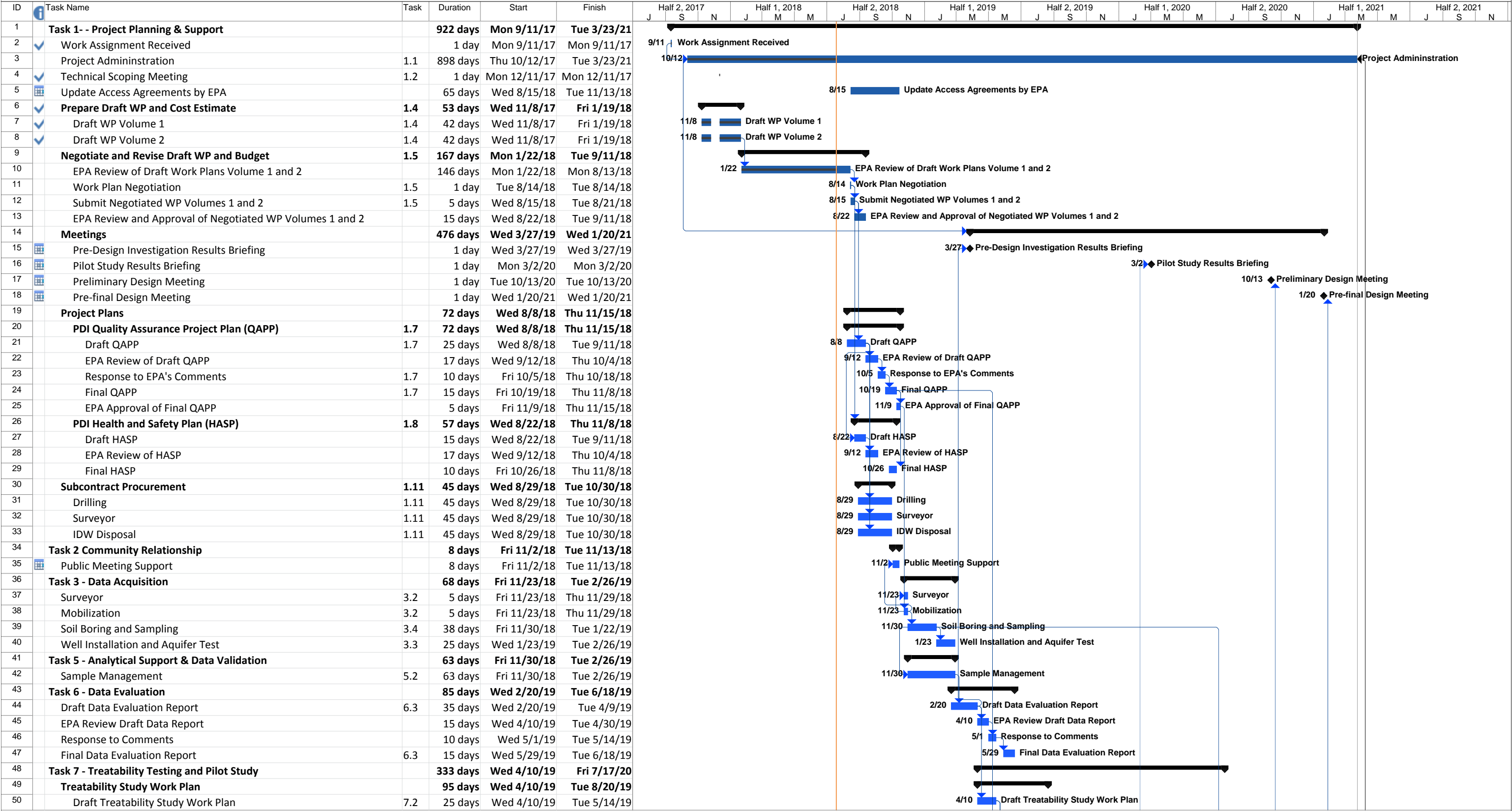
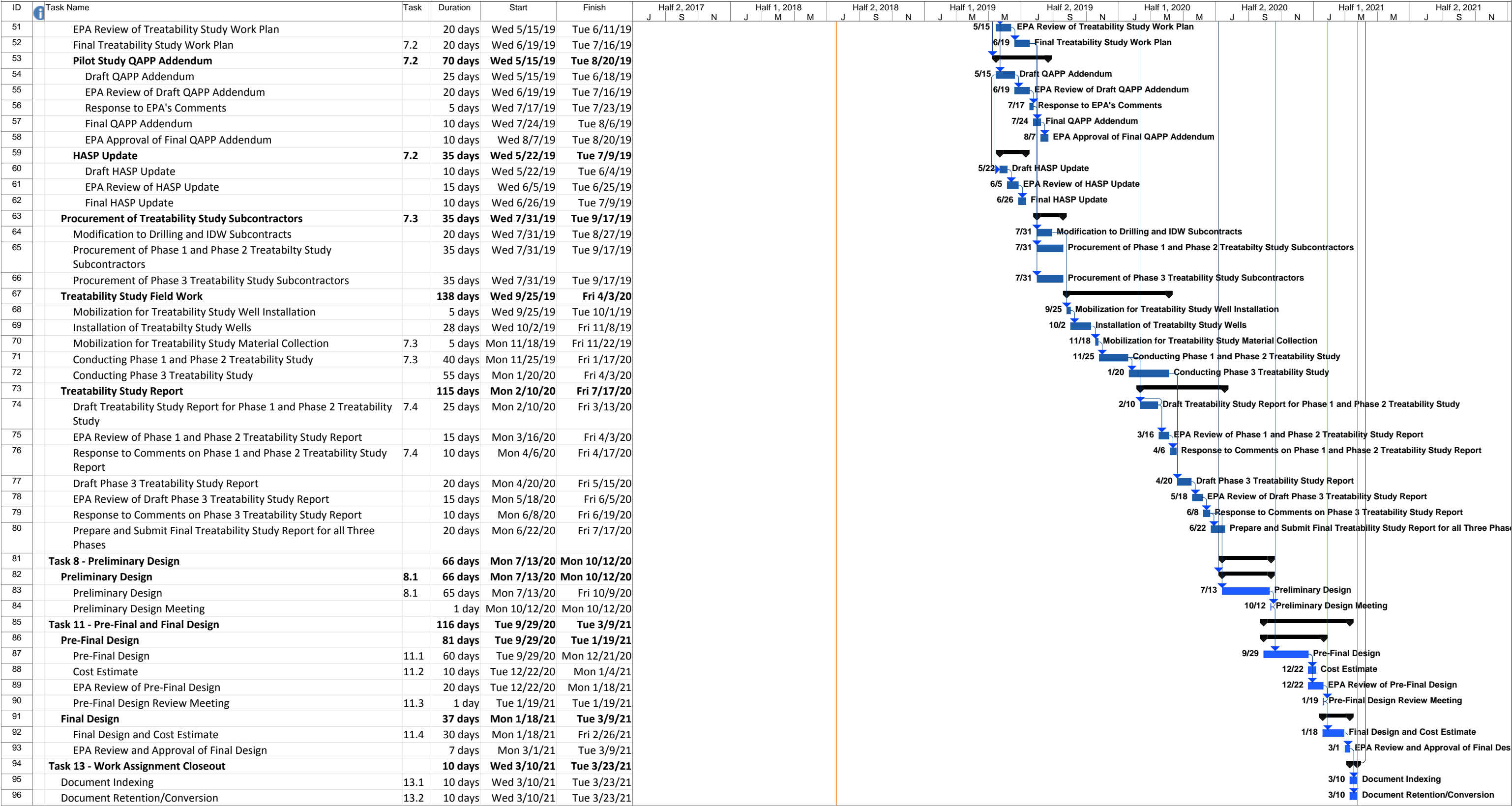
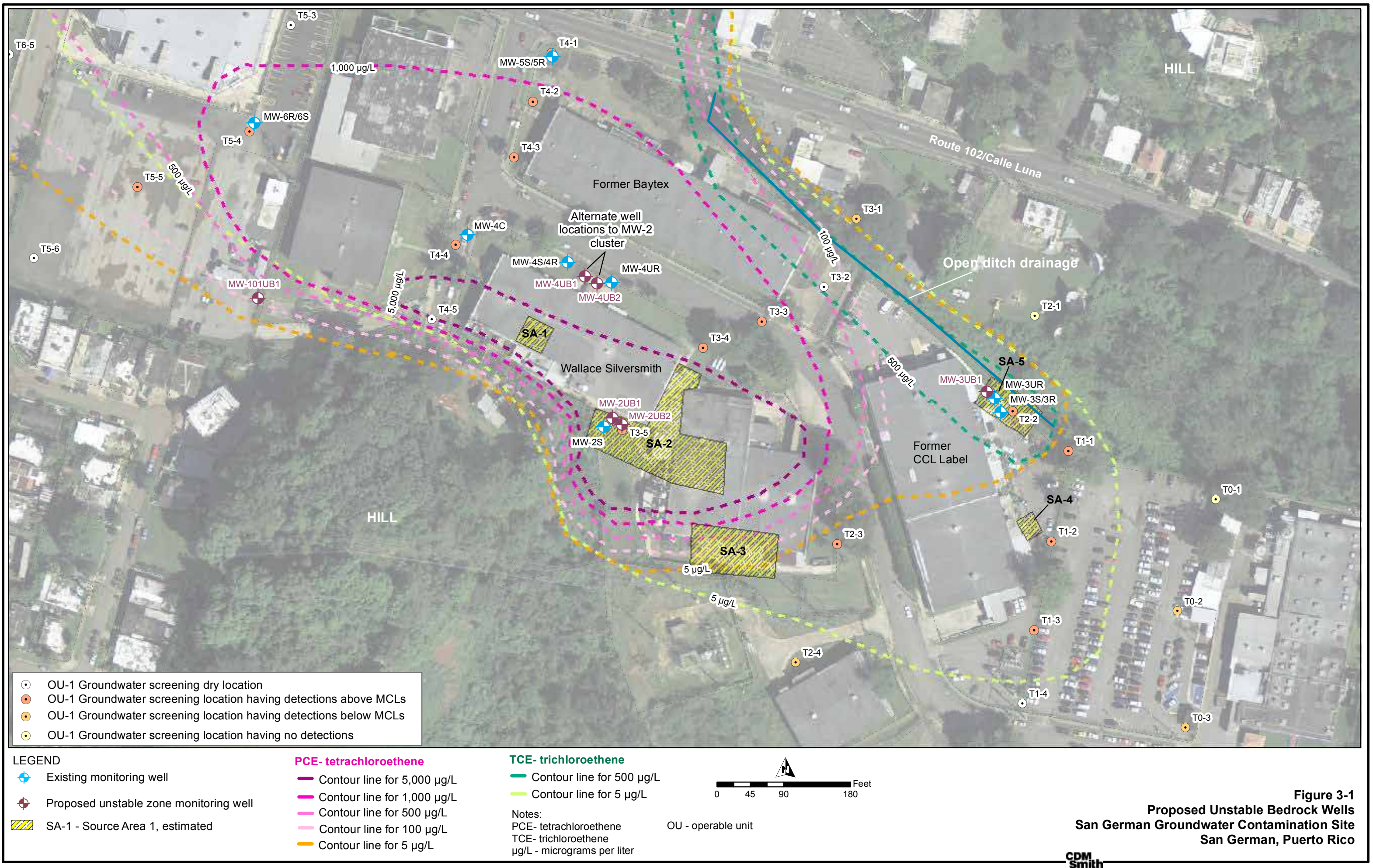
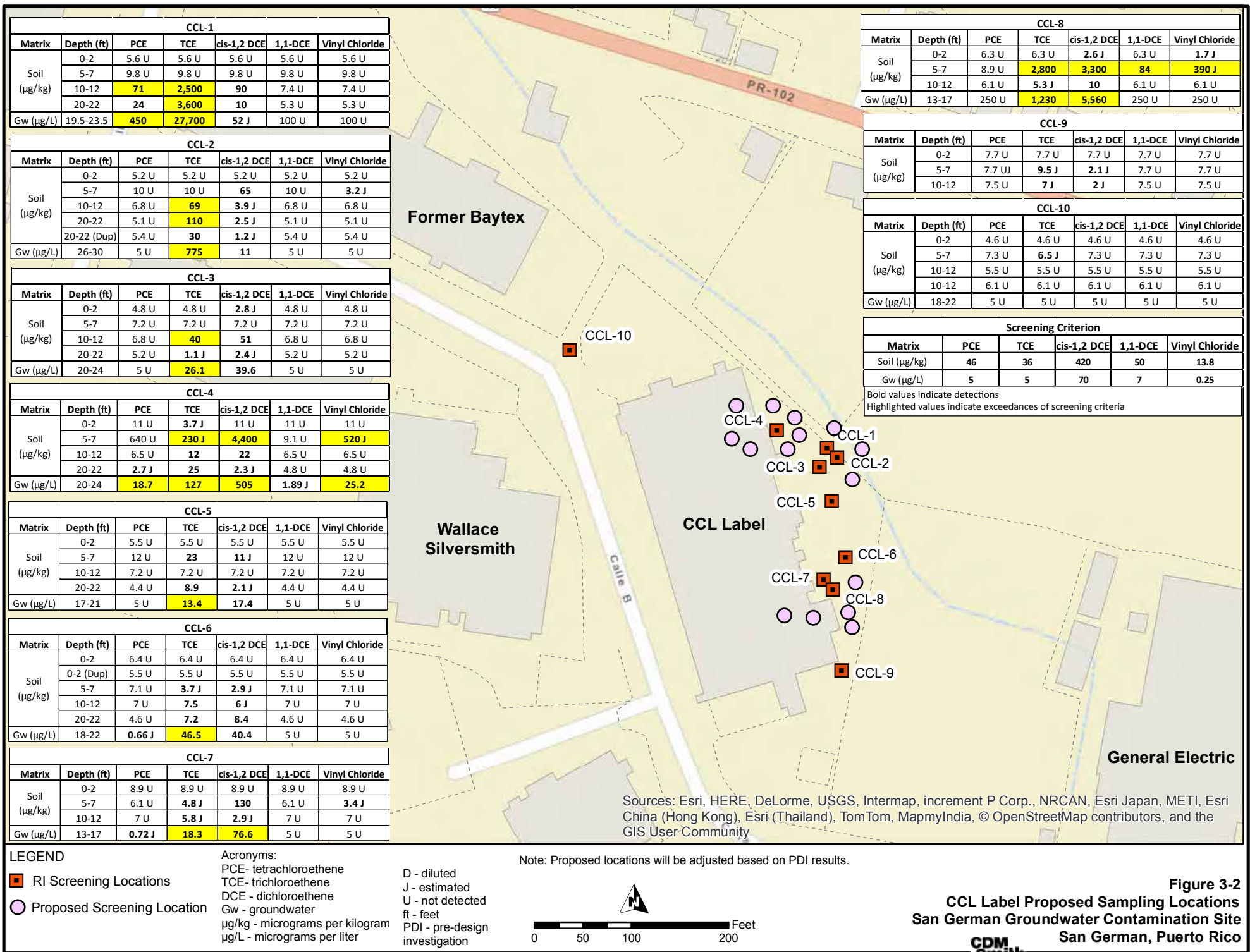
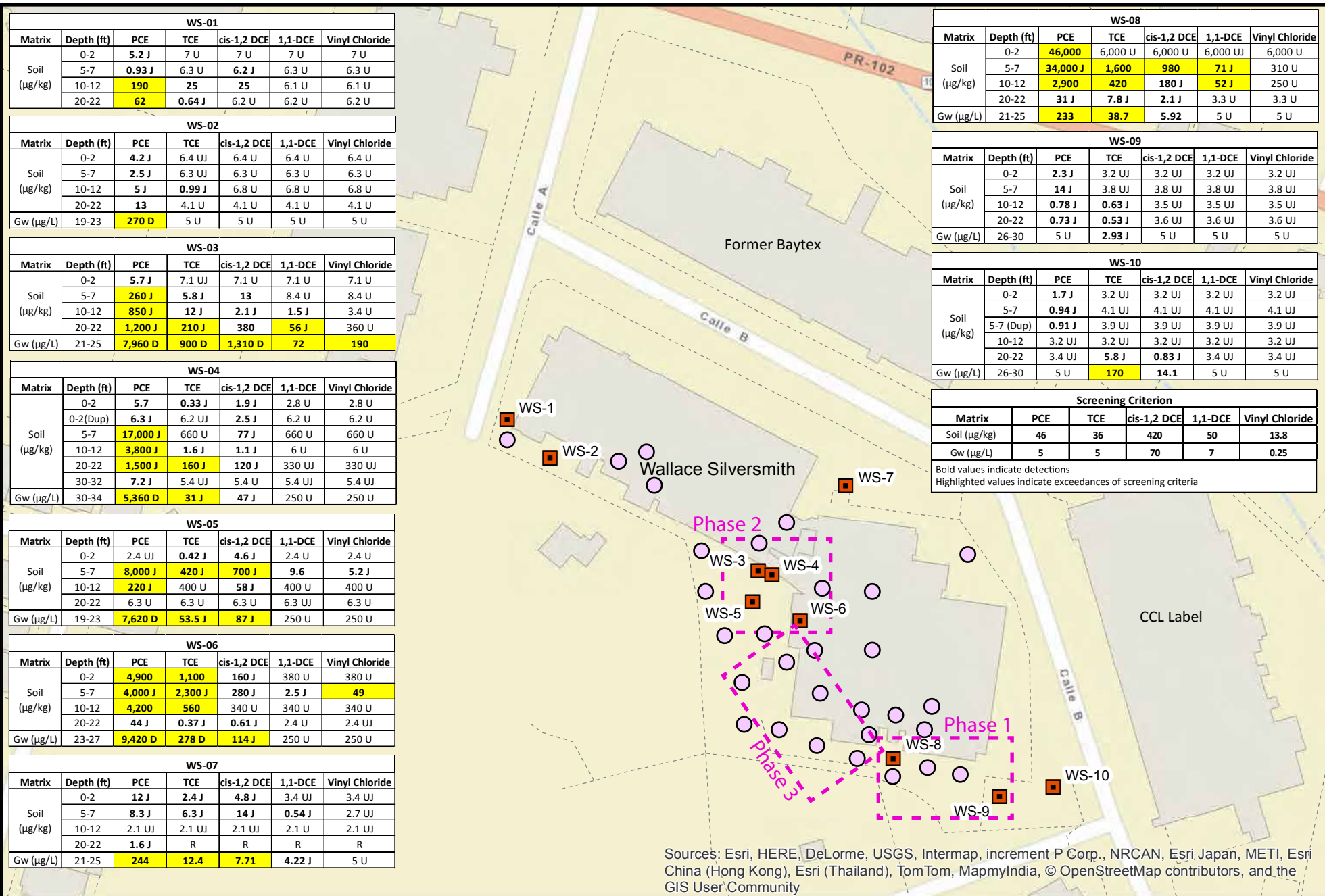


Figure 2-2
San German Contaminated Groundwater Site OU1 Remedial Design Schedule
San German, Puerto Rico









LEGEND

- RI Screening Location
- Proposed Screening Location
- Treatability Study Phase Location

Acronyms:
PCE- tetrachloroethene
TCE- trichloroethene
DCE - dichloroethene
Gw - groundwater
µg/kg - micrograms per kilogram
µg/L - micrograms per liter
R - rejected

Note: Proposed locations will be adjusted based on PDI results.

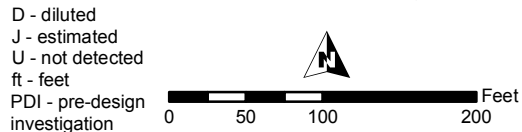


Figure 3-3
Wallace Proposed Sampling Locations
San German Groundwater Contamination Site
San German, Puerto Rico

CDM Smith

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Tables

Table 3-1
Proposed Well Installations
Remedial Design
San German Groundwater Contamination Site OU1
San German, Puerto Rico

Well ID	Well Locations	Well Construction	Target Screen Intervals (feet amsl)	Formation	Purpose	Drilling Method
Pump Test						
3 monitoring wells	Wallace or former CCL Label	4-inch PVC	135 -145	Saprolite	Obtain hydrogeological parameters for the saprolite zone where dewatering or groundwater extraction may be designed in the OU-1 RD	Hollow Stem Auger or Sonic
Monitoring Wells						
MW-2UB1 (MW-4UB1)	Source area south of the Wallace buildings (next to MW-2S; see Note 2)	4-inch PVC	75 - 85	Unstable bedrock	Delineate vertical extent of contamination	Sonic
MW-2UB2 (MW-4UB2)			90 -100			
MW-3UB1	Parking lot area east of former CCL Label (next to MW-3S and MW-3UR)	2-inch PVC	112 -122		Characterize groundwater at the boundary between the rock outcrop and the geologic setting south of Wallace (near MW-2S); Delineate southern plume boundary.	
MW-101UB1	Immediately downgradient of Wallace at the entrance to the driveway of the house southwest of Wallace		105 - 115			
Pilot Study Injection Wells						
2 injection wells	Wallace or former CCL Label	4-inch PVC	135 -145	Saprolite	Identify design parameters for in situ treatment at source area	Hollow Stem Auger or Sonic
2 monitoring wells				Unstable bedrock		
2 injection wells			90 -120 (based on Wallace)			
2 monitoring wells						

Notes:

1. Locations for the proposed monitoring wells are shown in Figure 3-1. These wells can be installed during the OU1 RD pre-design investigation or prior to pilot study.
2. If the area immediately south of Wallace cannot be accessed, the wells will be situated near MW-4S.
3. The layout of pilot study wells will be determined after the soil contamination is delineated in a treatability study work plan and the treatability study QAPP.
4. For pilot study, existing wells installed during the OU1 and OU2 RI and installed prior to the pilot study will be incorporated into the pilot study to the extent practical.

Additions included in Revised Draft Work Plan

Appendix A

Appendix A

Green Remediation Plan

SAN GERMAN RD GREEN REMEDIATION PLAN

ADMINISTRATIVE / PLANNING						
Task	Practice	Implementation	Goal	Measurement	Achievement	Considerations
Project Planning	Planning Meetings	Conduct green remediation strategy planning and progress meetings	Required	Yes/No	100%	-
	Establish a Vision	Establish goals, roles, & responsibilities	Required	Yes/No	100%	Update staff if responsibilities change
	Identify Opportunities	Identify critical site-specific resources and conditions	Required	Yes/No	100%	ASAP; look ahead to RAOs, potential remedies, and reuse (including timeframe)
		Capture & prioritize stakeholder ideas				Identify conflicts early; consider innovative approaches
	Establish Objectives	Prioritize & focus stakeholder ideas	Required	Yes/No	100%	Prioritize per project; document considerations & decisions
	Set Targets	Establish baselines and metrics	Required	Yes/No	100%	Complete 'Measurement' column
	Communicate Progress	Identify staff to monitor performance, document and evaluate practices, and share findings	Required	Yes/No	100%	Update staff if responsibilities change
	Schedule	Prepare schedule of meeting and reporting dates	Required	Yes/No	100%	Update staff when dates change
Document Production	Electronic Deliverables	EDD per RAC2	Required	Reduction in paper usage vs. hardcopy deliverables		Based on EPA RPM request for paper vs. electronic deliverables; insert CDs in reports containing appendices with seldom-reviewed data (e.g., detailed data tables, field logbooks, COCs)
	Double-Sided Hardcopies	Use established RAC2 guidelines with CDM Smith SPIN format	Required	Reduction in paper use vs. single-sided		All documents; minimize draft and color printing
	Purchase Recycled Goods	Purchasing staff buy recovered material paper products	Required	NA at project level		Per RAC2 Contract Clause F.5
File Management	Electronic Filing	ProjectWise electronic document management tool	Yes	Yes/No		CDM Smith electronic document repository; maintain all records of "green-related" activities
	Electronic Document Sharing	Establish eRoom or other web-based project space as project repository	Yes	Yes/No		Provide shared access to electronic versions
Meetings	Virtual Meetings	NetMeetings or conference calls when possible	Required	% of total; \$ saved		Travel, ODCs
Community Involvement	Stakeholder Engagement	Include community and stakeholders at the start of the project	Required	Yes/No		Coordinate with EPA on stakeholder and community involvement during project planning
Land Planning	Understand Site Reuse	Evaluate local planning documents, coordinate meetings with EPA, municipality, etc.	Required	Yes/No		Consider long-term land uses; aim for most beneficial reuse
Subcontracting	Use Local Subcontractors	Plan procurement to allow local subcontractors to perform portions of work	Yes	Yes/No		Perform 'Green Screen' of draft SOWs; consider requiring subcontractors to use local staff
	Electronic Deliverables	Request electronic deliverables from subcontractors	100%	% of total		Always request electronic deliverables
	Sustainable Practices	Include sustainable practices in SOWs	Yes	Yes/No		Perform 'Green Screen' of draft SOWs; consider requiring subcontractors to use local staff
		Require subcontractors to follow EPA Region 2's 'Clean & Green' Policy	Required	Yes/No		Write into subcontract procurements; noise control, clean diesel fuels and technologies, industrial materials reuse and recycling within regulatory requirements when applicable
		Require the use of innovative approaches	Required	Per technology or approach		Document considerations & decisions; always consider innovative approaches during planning

SAN GERMAN RD GREEN REMEDIATION PLAN

GENERAL ON-SITE OPERATIONS						
Task	Practice	Implementation	Goal	Measurement	Achievement	Considerations
Staffing	Staff Efficiently	Use local staff when possible	Yes	Yes/No; reductions in travel & fuel consumption		Minimize auto, mileage, hotel, per diem, number of field mobilizations
	Resource Conservation	Carpool when possible, use hybrid vehicles if available, reduce idling	Yes	Reduction in travel & fuel consumption		Minimize auto mileage and fuel use; implement during field planning meetings
Mobilization	Materials Reuse	Make efforts to reuse materials	Yes	Estimated cost/footprint of products and materials reused		Reuse or recycle materials within regulatory limits when applicable
	Sustainable Products	Coordinate expendable equipment among sites under contract; update inventory & requests on RAC2 eRoom	Required	Reduction in materials purchased		Use existing CDM Smith expendable equipment inventory; minimize shipping/transport
		Purchase (recycled) expendables locally	Yes	Yes/No; estimate recycled quantities		Coordinate with purchasing; maximize use of products with recycled content
Waste Management	Recycling	Incorporate project & site activities into local recycling program	Site-Specific	Yes/No; approximate quantities		Recycle locally, where possible; conform to local requirements and regulations; consider site access, containers, fees
Workspace	Sustainable Products	Trailer: secure locally	Yes	Yes/No; reduction in non-renewables		Obtain trailer from nearest vendor if possible
		Trailer: secure green product	Site-Specific	Per product		Procure from vendor if available; ask vendor about green trailers
		Use CFLs	Site-Specific	Fewer kWh used; Yes/No		Use CFLs if available
		Efficient electronics	Site-Specific	Yes/No; reductions		Use ENERGY STAR appliances if available
	Optimization	Situate trailer to benefit from existing vegetation or sunlight	Site-Specific	Site-specific		Determine during site visit and mobilization
Waste Management	Resource Conservation	Minimize IDW	Site-Specific	Volume or % reduced		Utilize DPT for installation of soil borings and wells where appropriate to eliminate drill cuttings, avoid consumption or disposal of drilling fluids, and reduce drilling duration by 50-60%
Utilities	Resource Conservation	Purchase renewable energy via local utility programs	Site-Specific	kWh of renewable power purchased		Use guideline and procedure developed for RAC2, "Touchstone Technologies"; confirm if renewable energy is available on island
		Purchase RECs	Site-Specific	kWh of RECs purchased		Consider use of RECs when renewable energy is unavailable locally
	Minimize Water Use	Protect, conserve, and reuse water	Yes	Volume or % reused		Consider water reuse or disposal of aqueous IDW at adjacent POTW if feasible

SAN GERMAN RD GREEN REMEDIATION PLAN

PRE-DESIGN INVESTIGATION / TREATABILITY STUDY						
Task	Practice	Implementation	Goal	Measurement	Achievement	Considerations
Drilling	Minimize IDW and Reduce Drilling Time	Consider alternative drilling methods	Required	Waste produced vs. traditional technologies		Required during project planning; DPT to be utilized during investigation to eliminate drill cuttings and associated waste disposal, avoid consumption or disposal of drilling fluids, and reduce drilling duration
Planning	Understand Site Reuse	Ensure sampling plan is appropriate to meet RAOs	Required	Yes/No		Use DQO process throughout project
Sampling	Data Effectiveness	Perform real-time screening in field	Yes	Yes/No		Use real time and near-real time field screening technologies (e.g., to optimize soil boring sampling) as appropriate.
	Materials Reuse	Reuse dedicated materials when performing multiple rounds of groundwater sampling; reuse equipment	Site-Specific	Yes/No; report decision criteria		Dedicated tubing will be used at the groundwater monitoring wells; consider reuse of SVE, DPE, and in-situ treatment pilot system equipment
	Construction Efficiency	Consider alternative methods	Site-Specific	Reduction in scope and waste generation vs. traditional wells		Plan monitoring well locations so they can be utilized during the RA
Well Installation	Resource Conservation	Minimize impacts on natural resources	Yes	Yes/No		Wetland areas, streams, etc.
REMEDIAL DESIGN						
Task	Practice	Implementation	Goal	Measurement	Achievement	Considerations
Subcontracting	TBL	Incorporate sustainable practices into the design specifications	Yes	Yes/No		Perform a 'Green Screen' on design specifications
Document Production	Electronic Deliverables	Electronic plans and specifications	Site-Specific	Reduction in paper usage		Based on EPA RPM request for paper vs. electronic deliverables
Design	Optimization	Performance-based design	Site-Specific	Various		Can reduce design time and detail of specification package, allow contractors to select familiar goods, reduce paperwork and change orders
		Project phasing / sequencing	Site-Specific	Various		Planned operational phasing; progressive use of smaller, mobile treatment systems
		Remote instrumentation	Yes	Yes/No; %		Operational efficiencies while reducing costs, conserving non-renewables, and saving time
		Minimize materials handling	Yes	Yes/No; %		In situ, load-and-go when possible
		Evaluate energy efficiencies for equipment specifications	Yes	Yes/No		Choose energy-efficient equipment that meets design requirements; incorporate into design specifications
	Recycling	Reuse or recycling of demolished / excavated materials	Site-Specific	Quantity of materials reused or recycled; transportation costs avoided		Minimizes shipping volumes; can minimize hazardous quantities; concrete, asphalt, metal, etc.
	Materials Reuse	Consider reuse of existing structures and equipment	Site-Specific	Materials diverted from waste stream; manufacture of replacement		Minimizes disturbance, conserves resources
	Waste Minimization	Optimize well ROIs to reduce number of wells required	Yes	Yes/No		Well spacing optimization will eliminate drill cuttings and associated waste disposal
	Resource Conservation	Minimize site disturbance	Site-Specific	Yes/No; sf reduction		Minimize construction site and disturbance of adjacent areas
		Minimize construction footprint	Yes	Yes/No; % reduction		Ensure long-term requirements are met
	Environmental Quality	Include noise level controls	Yes	Yes/No; % reduction		Consider noise levels in selection of equipment and design of system
Power	Renewable Energy	Incorporate alternative energy use in specifications	Site-Specific	Yes/No		Consider use of alternative energy sources in design if possible
Infrastructure	Green Building	Engage LEED® designer early to evaluate and plan sustainable elements of building	100%	Yes/No		Design sustainable elements into site buildings using LEED® design principles and practices

SAN GERMAN RD GREEN REMEDIATION PLAN

Acronyms and Abbreviations:

ASAP	as soon as possible	ODC	other direct cost
CD	compact disc	POTW	publicly owned treatment works
CFL	compact fluorescent lamp	RA	remedial action
COC	chain-of-custody	RAC2	Region 2 Remedial Action Contract 2
DPT	direct push technology	RAO	remedial action objective
DQO	data quality objective	REC	renewable energy certificate
EDD	electronic data deliverable	ROI	radius of influence
EPA	United States Environmental Protection Agency	RPM	remedial project manager
IDW	investigation-derived waste	sf	square foot
LEED®	Leadership in Energy and Environmental Design	SOW	statement of work
kWh	kilowatt-hour	SPIN	Sales Publication Information Network
NA	not applicable	TBL	triple bottom line